

THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1-24. Cancelled.

25. (Amended) A processing apparatus comprising:

a gas supply mechanism that supplies a processing gas into a processing chamber via a plurality of gas supply holes formed at a shower head and including a plurality of primary gas supply holes and a plurality of circulating gas supply holes,

an evacuating mechanism that evacuates the processing gas from said processing chamber, and

a gas circulating mechanism that returns at least a portion of exhaust gas evacuated from said processing chamber to said gas supply mechanism,

wherein said gas supply mechanism includes,

a primary gas supply system that supplies primary gas supplied from a processing gas source into said processing chamber via said primary gas supply holes, and

a circulating gas supply system that supplies at least a portion of the exhaust gas into said processing chamber via said circulating gas supply holes with said primary gas supply system and said circulating gas supply system constituted as systems independent of each other at said shower head,

~~wherein the ratio of the number of said primary gas supply holes and the number of said circulating gas supply holes equals the target ratio of a primary gas flow rate and a circulating gas flow rate, the flow rate of the circulating gas being higher than the flow rate of the primary gas, so that the number of said circulating gas supply holes is greater than the number of said primary gas supply holes, and~~

~~wherein the hole radius and the hole density of said primary gas supply holes are constant over an entire surface, and~~

said primary gas supply system and said circulating gas supply system are connected with each other via piping having a means for flow rate adjustment mounted thereon.

26. Cancelled.

27. (New) The processing apparatus of claim 25, wherein said means for flow rate adjustment regulates the flow of the primary gas to said circulating gas supply system supplied from said processing gas source.

28. (New) The processing apparatus of claim 25, wherein the ratio of the number of said primary gas supply holes and the number of said circulating gas supply holes equals the target ratio of a primary gas flow rate and a circulating gas flow rate, the flow rate of the circulating gas being higher than the flow rate of the primary gas, so that the number of said circulating gas supply holes is greater than the number of said primary gas supply holes.

29. (New) The processing apparatus of claim 25, wherein the hole radius and the hole density of said primary gas supply holes are constant over an entire surface and the hole radius and the hole density of said circulating gas supply holes are constant over the entire surface.

30. (New) The processing apparatus of claim 25, wherein primary gas supply holes formed in a specific area are surrounded by circulating gas supply holes formed in a number larger than the number of said primary gas supply holes in said specific area.

31. (New) The processing apparatus of claim 25, wherein the ratio of the total area of said primary gas supply holes and the total area of said circulating gas supply holes equals the target ratio of a primary gas flow rate and a circulating gas flow rate, the flow rate for the circulating gas being higher than the flow rate for the primary gas, so that the total area of said circulating gas supply holes is greater than the total area of said primary gas supply holes.

32. (New) The processing apparatus of claim 25, wherein the total area of said circulating gas supply holes is set so as to ensure that the back-pressure is equal to or lower than the rated back-pressure of said evacuating mechanism when said circulating gas is supplied at the target flow rate.

33. (New) The processing apparatus of claim 25, wherein the ratio of the number of said primary gas supply holes per unit area and the number of said circulating gas supply holes per unit area at said gas supply mechanism is constant over the entire surface of said gas supply mechanism.

34. (New) The processing apparatus of claim 25, wherein the conductance of said circulating gas supply system is set higher than the conductance at said gas supply mechanism.

35. (New) The processing apparatus of claim 25, wherein a buffer space is provided at least at one of said gas circulating mechanism and said circulating gas supply system.

36. (New) The processing apparatus of claim 25, wherein a means for filtering said circulating gas is provided at least at one of said gas circulating mechanism and said circulating gas supply system.

37. (New) The processing apparatus of claim 25, wherein the gas supply mechanism is configured to provide the primary gas at the outlet of said primary gas supply holes into said processing chamber at a velocity equal to or higher than 500 m / sec.

38. (New) The processing apparatus of claim 25, wherein the gas circulating mechanism is configured to provide said circulating gas at the outlet of said circulating gas supply holes into said processing chamber at a velocity equal to or higher than 500 m / sec.

39. (New) A processing method for processing a workpiece by using a processing gases constituted of a primary gas and a circulating gas in a processing apparatus including a gas supply mechanism that supplies a processing gas into a processing chamber via a plurality of gas supply holes formed at a shower head and including a plurality of primary gas supply holes and a plurality of circulating gas supply holes, an evacuating mechanism that evacuates the processing gas from said processing chamber, and a gas circulating mechanism that returns at least a portion of exhaust gas evacuated from said processing chamber to said gas supply mechanism, wherein said gas supply mechanism includes, a primary gas supply system that supplies primary gas supplied from a processing gas source into said processing chamber via said primary gas supply holes, and a circulating gas supply system that supplies at least a portion of the exhaust gas into said processing chamber via said circulating gas supply holes with said primary gas supply system and said circulating gas supply system constituted as systems independent of each other at said shower head, the method comprising:

a step in which the pressure inside said gas circulating mechanism is raised by supplying the primary gas into said processing chamber through said primary gas supply holes and allowing the circulating gas to flow into said gas circulating mechanism

without supplying the evacuating gas into said processing chamber through said circulating gas supply holes;

a step in which the flow rate of the circulating gas is stabilized by supplying the evacuating gas through said circulating gas supply holes; and

a step in which the workpiece is subsequently processed.

40. (New) The method of claim 39, further comprising:

a step executed after said step in which the workpiece is processed, in which the pressure inside said gas circulating mechanism is raised in order to process a next workpiece following the workpiece by trapping the circulating gas present inside said gas circulating mechanism.

41. (New) The method of claim 39, wherein the flow rate of the primary gas supplied during said step in which the pressure inside the gas circulating mechanism is raised is higher than the flow rate of the primary gas supplied during said step in which the workpiece is processed.

42. (New) The method of claim 41, wherein the mixing ratio of the primary gas supplied during said step in which the pressure inside said gas circulating mechanism is raised is equal to the mixing ratio of the primary gas supplied during said step in which the workpiece is processed.

43. (New) A processing method for processing a workpiece by using a processing gases constituted of a primary gas and a circulating gas in a processing apparatus including a gas supply mechanism that supplies a processing gas into a processing chamber via a plurality of gas supply holes formed at a shower head and including a plurality of primary gas supply holes and a plurality of circulating gas supply holes, an evacuating mechanism that evacuates the processing gas from said processing chamber, and a gas circulating mechanism that returns at least a portion of exhaust gas evacuated from said processing chamber to said gas supply mechanism, wherein said gas supply mechanism includes, a primary gas supply system that supplies primary gas supplied from a processing gas source into said processing chamber via said primary gas supply holes, and a circulating gas supply system that supplies at least a portion of the exhaust gas into said processing chamber via said circulating gas supply holes with said primary gas supply system and said circulating gas supply system constituted as systems independent of each other at said shower head, the method comprising:

a step in which the primary gas is supplied through both said primary gas supply holes and said circulating gas supply holes; and

a step in which the primary gas is supplied through said primary gas supply holes and the circulating gas is supplied through said circulating gas supply holes.

44. (New) The method of claim 43, wherein processing is first executed by supplying the primary gas alone without circulating the circulating gas and then processing is executed by supplying both the primary gas and the circulating gas.

45. (New) The method of claim 43, wherein the flow rate at which the circulating gas is supplied is set higher than the flow rate at which the primary gas is supplied when supplying the primary gas and the circulating gas.